

## CLAIMS

[1] A surface-coated high hardness material for tool comprising:

a cubic boron nitride sintered compact (CBN sintered compact, hereinafter) as a substrate, and

at least one coating film layer formed on the surface of the substrate wherein said coating film layer has thickness of  $0.1\text{ }\mu\text{m}$  or more and less than  $1\text{ }\mu\text{m}$  and comprises, as main component, a compound having at least one kind of element selected from C, N and O, and at least one kind of element selected from Ti and Al.

[2] The surface-coated high hardness material for a tool according to claim 1, wherein the coating film comprises nitride or nitrogen carbide of Ti and Al, and when diffraction strength of (111) plane in X-ray diffraction of the coating film is  $I(111)$  and diffraction strength of (200) plane is  $I(200)$ , a relation of  $0 \leq I(200)/I(111) \leq 3$  is established.

[3] The surface-coated high hardness material for a tool according to claim 1 or 2, wherein the coating film has composition expressed by  $(\text{Ti}_{1-x}\text{Al}_x)\text{N}$ ,  $0.3 \leq x \leq 0.6$ .

[4] The surface-coated high hardness material for a tool according to any one of claims 1 to 3, wherein the coating film has a composition expressed by  $(\text{Ti}_{1-x}\text{Al}_x)\text{N}$ ,  $0.3 \leq x \leq 0.45$ .

[5] The surface-coated high hardness material for a tool according to any one of claims 1 to 4, wherein average grain diameter of crystal constituting the coating film is  $50\text{ nm}$  or more and less than  $150\text{ nm}$ .

[6] The surface-coated high hardness material for a tool according to any one of claims 1 to 5, wherein a portion of Ti included in the coating film is replaced by at least one kind of element selected from periodic table 4a, 5a and 6a group transition metal elements excluding Si, B and Ti, a content of replaced element in the coating film is less than 10 atom %.

[7] The surface-coated high hardness material for a tool according to any one of claims 1 to 6, wherein the surface-coated high hardness material for a tool is used for a grooving tool.

[8] The surface-coated high hardness material for a tool according to any one of claims 1 to 7, wherein the substrate is a sintered compact comprising 30 to 90% by volume cubic boron nitride (CBN) powder and balance of bonding material, the balance of bonding material comprises aluminum compound, inevitable impurities and at least one compound selected from nitride, carbide, boride, oxide of periodic table 4a, 5a and 6a elements and solid solution thereof.

[9] The surface-coated high hardness material for a tool according to any one of claims 1 to 8, wherein total film thickness of the coating film is 0.1  $\mu\text{m}$  or more and less than 0.5  $\mu\text{m}$ .

[10] The surface-coated high hardness material for a tool according to any one of claims 1 to 9, wherein the surface-coated high hardness material for a tool is used for high precision cutting tool for quenched steel and here, the high precision cutting means cutting having feed of 0.08 mm/rev or less.